only been expatiated on here in order to point a moral. On his main subject Mr. Hasluck is absolutely trustworthy, and has produced a book which is a credit to himself, to the British School at Athens, and to the University of Cambridge.

H. R. HALL.

RADIOTELEGRAPHY.

Jahrbuch der drahtlosen Telegraphie und Telephonie. Band iii., Hefts 1–6. Pp. 1–634. (Leipzig: Johann Ambrosius Barth, 1909–10.)

FOR those who wish to keep pace with the rapid theoretical and practical progress that is being made in wireless telegraphy, this Jahrbuch is almost indispensable. It contains full accounts of many important researches, abstracts of others, and each number gives a very complete bibliography of the literature on the subject, also a brief account of recent patents.

Glancing through the pages of the present volume, we are impressed with the great improvements that have been made in quantitative measurements. The phenomena dealt with are exceedingly complicated, and as a time interval of one-millionth of a second is long, the inertia of ordinary matter makes it mechanically impossible to follow the rapid changes that take place in an oscillating circuit. Fortunately, the inertia of a kathode stream is practically negligible, and the Braun tube is, in consequence of this, very frequently used in researches on electrical oscillations. This instrument has been utilised by Vollmer in an elaborate investigation of the Poulsen arc (pp. 117–74, 213–50), and by Roschansky in a shorter series of experiments on spark gap resistance (pp. 21–57). From both papers it is evident that much remains to be done before a satisfactory *quantitative* theoretical explanation of the behaviour of arcs and sparks can be given.

There are several papers on the mathematical theory of coupled circuits. Mackü criticises the work of Cohen, discusses the theory of the Fischer method for examining the two waves in coupled oscillators, and gives some approximation formulæ of his own. Berthenod compares direct and inductive coupling mathematically, a problem of particular interest at the present moment.

The problem of long-distance transmission has brought forth many mathematical discussions of the diffraction of electromagnetic waves; one by H. Poincaré appears in the present volume. But it is doubtful whether diffraction plays a very important part; a highly conducting layer of air in the upper regions of the atmosphere would probably be a much more important factor. Very little has so far been published regarding long-distance transmission. Surely a large number of valuable statistics must have been gathered during the past few years at powerful wireless telegraph stations, like Marconi's transatlantic stations, the publication of which would be of the greatest theoretical and practical interest.

Only three papers appear from English men of science—one by Lodge and Muirhead on "The general principles of syntonic wireless telegraphy"; a second by Fleming, "Some quantitative measurements in radiotelegraphy"; and a third by N. Campbell on "The æther."

Wireless telegraphy seems to be very much neglected by the technical colleges in this country; which is most regrettable, as probably in no other branch of engineering is it so essential that an original investigator should have such a very thorough grasp of the fundamental principles of physics.

MODERN ENGINEERING ACHIEVEMENTS.

Engineering of To-day. By T. W. Corbin. Pp. xvi+367. (London: Seeley and Co., Ltd., 1911.) Price 5*s.* net.

THE author of this book has set himself the task of giving a popular account of the present developments of engineering science, illustrating his text with diagrams and photographs, and, although he has not attempted to make any rash forecasts, yet he has indicated the directions in which future developments are likely to occur.

The first few chapters are devoted to the various sources of power; the steam engine, the gas engine, and hydraulic motors, are all in turn dealt with; then follows a chapter on how this power is transmitted, special attention being devoted to electrical methods. The author next treats of the materials used by the engineer, and modern methods of manufacture. In describing the cantilever system of bridge construction, it is a pity that the author did not adopt the elegant illustration given by the late Sir Benjamin Baker in the course of a popular lecture on the design of the great structure across the Firth of Forth. Ship construction is explained somewhat fully, and a clear account is given of the structural design of most of the leading types of passenger and cargo boats; to ships of war a special chapter is devoted, and, as an illustration of the most modern type of battleship, the author has selected the *Minas Geraes*, recently built by the firm of Sir W. G. Armstrong, Whitworth and Co. for the Brazilian Government. Submarine work and submarine diving form the subject of another chapter.

A short account is given of the filtration of water prior to its distribution to the consumer, but no mention is made of the system of mechanical filtration, which has recently been extensively adopted. As an illustration of a great water scheme, the author has selected the Coolgardie water supply, probably the most daring scheme ever conceived, and one which has proved entirely successful.

Three excellent chapters are those devoted to railways and their work; a description is given of the construction of a modern express locomotive, and details as to the signalling appliances which have to be adopted in order to secure the safety of trains on lines crowded with traffic.

That the book is quite up to date is proved by the

chapter entitled "The Conquest of the Air," in which accounts are given of the latest types of dirigible balloons and of aëroplanes.

In the concluding chapter the author attempts to discuss the engineering of to-morrow. He rightly points out that for many years to come the energies of the engineer will be directed mainly towards the problem of the "utilisation of waste materials and waste forces." The author suggests that in the utilisation of the heat and energy given out by the sun a solution may be found for the difficulty which will arise when the world's coal supply is exhausted. All such proposals are, however, still mere ideas.

The author of this book set himself a difficult task, and he has accomplished it in a satisfactory manner.

T. H. B.

TECHNICAL MYCOLOGY.

Technical Mycology: The Utilisation of Micro-Organisms in the Arts and Manufactures: A Practical Handbook on Fermentation and Fermentative Processes for the Use of Brewers and Distillers, Analysts, Technical and Agricultural Chemists, Pharmacists, and all interested in the Industries dependent on Fermentation. By Prof. F. Lafar. Translated by Charles T. C. Salter. Vol. ii., "Eumycetic Fermentation." Part ii. Pp. x+191–748. (London: C. Griffin and Co., Ltd., 1910.) Price 18*s.* net.

THOSE who worked with the first volume, and the first part of the second volume of Lafer's "Technical Mycology," have waited, with some little impatience, for the appearance of the second part of the latter volume. We have waited our seven years, but have, at last, been rewarded by a work that will be of considerable value to those who are working at eumycetic fermentation, the consideration of which is continued by Prof. Lafar and by a number of experts, each of whom has undertaken to treat a part of this question.

In an introductory section Prof. Lafar himself takes up the general question of yeast nutrition and yeast culture, and brings his subject well up to date. An interesting chapter on variability and heredity in Saccharomycetes may have a much wider bearing than in its application to brewing. Our author points out the importance of the presence of certain mineral foodstuffs, and indicates the possible sources of organic foodstuffs, laying special stress on the sources of nitrogen and on the oxygen requirements of the yeast cell. Here, in connection with Hansen's experiments, he indicates the most favourable conditions for cell reproduction, and the oxygen requirements for both cell-reproduction and respiration. Then follows a description of the effect of copper and its salts, inorganic acids and salts, organic stimulants and poisons, and of alcohol itself upon the yeast cells. Some part of this is repeated by Albert Klöcker, of Copenhagen, who, treating the matter from a somewhat different point of view, gives a very good account of the life-history and variability of the Saccharomycetes, and describes fundamental researches into the life-history of these organisms, temporary variations, and the production of sporing and non-sporing forms, and the development and maintenance of these varieties under various definite conditions. Klöcker also contributes an interesting and full classification of the families Saccharomycetaceæ and Schizosaccharomycetaceæ, which will probably be an accepted classification for some time to come.

In a chapter on the morphology and subdivision of the family Aspergillaceæ, Prof. Carl Wehmer gives an account of the saccharification of starch, acid fermentation, formation of alcohol, and the degradation of proteids and their derivatives by the members of this family. Special articles are also contributed by Prof. G. Lindau on "*Cladosporium herbarum* and *Dematium pullulans*"; by Dr. H. Will on "The Torulaceæ, Pink Yeasts and Black Yeasts"; by Prof. Richard Meissner on "Mycoderma or 'Mother of Vinegar'"; by Prof. H. Müller-Thurgau on "The History, Morphology, and Fermentation phenomena of *Saccharomyces apiculatus*"; by Dr. H. Wichmann on the Monillæ and Oidia; and, in the section devoted to enzymes and enzyme actions of yeast, by Dr. Rudolf Rapp on "Alcoholase," by Dr. Arminius Bau on "The Chemistry of Alcoholic Fermentation and on the Enzymes Decomposing the various Sugars"; whilst Dr. Lafar and Dr. M. Hahn close the work with a chapter on "Endotryptase and Philothion."

The new method of treatment, though it takes away somewhat from the continuity of the story, has many advantages in so far that each part is treated by a special authority, and has thus been brought more fully up to date than would have been possible had Dr. Lafar attempted to cover the whole ground single-handed

The subject-matter of the latter part of the work, dealing with enzymes and enzyme actions of yeast, has passed through such rapid transformation within quite recent years, and is still being so highly developed that it would be impossible for any single writer to keep pace with the enormous numbers of publications that have appeared, and to summarise at all adequately the work thus presented to botanists and chemists. How difficult this would have been may be gathered from the bibliography given at the end of the book, a bibliography which covers more than 130 pages, each page containing from twenty to forty titles of papers. In this volume is contained a very full index of the whole work, without which the reader will have some difficulty in gaining access to the material contained in the earlier published volume and part. The translator has done his share of the work well; the illustrations are good, and the general appearance of the book corresponds very closely to that of the earlier issues. The completed work is far more valuable than it is in the individual parts, and we strongly advise those who take an interest in the technical subjects dealt with in this part to read it, and then keep it for reference alongside the others.